

Unmanned Ground Surveillance Vehicle (UGSV) Project

The **Unmanned Ground Surveillance Vehicle (UGSV)** is a **robotic vehicle** designed for **remote monitoring, surveillance, and navigation**. It provides an excellent platform for **students and beginners in robotics and IoT** to learn about **motor control, wireless communication, and obstacle detection**. With real-time camera integration and sensor modules, UGSV is ideal for **security and defense-inspired projects**.

Why Build a UGSV?

- Beginner-friendly robotics project
- Uses Arduino/ESP32 for motor & sensor control
- Wireless control via Wi-Fi or Bluetooth
- Obstacle detection using ultrasonic sensors
- Camera integration for live surveillance

Key Features for Beginners

- Motor Driver (L298N/L293D) for wheel control
- Ultrasonic sensor for obstacle detection
- Wi-Fi/Bluetooth module for remote navigation
- Rechargeable battery-powered mobility
- Camera module (optional) for surveillance

UGSV Hardware Basics

The **UGSV hardware setup** consists of **DC motors with a motor driver, ultrasonic sensor, and microcontroller**. It can be controlled wirelessly via a mobile app or joystick, making it perfect for **security and monitoring applications**.

Quick Specs

- Motor Driver: L298N / L293D
- Sensor: HC-SR04 Ultrasonic
- Microcontroller: Arduino Uno / ESP32
- Wireless: Bluetooth HC-05 / ESP32 Wi-Fi
- Power: 7.4V – 12V Battery Pack

First Project: Basic Motor & Obstacle Detection

The **Basic UGSV Project** moves the vehicle forward and stops if an obstacle is detected within a set distance. This introduces **motor control and ultrasonic sensing**.

Connections:

- DC Motors → Motor Driver L298N → Arduino/ESP32
- Ultrasonic Sensor (HC-SR04) → Arduino Pins (Trig, Echo)
- Bluetooth/Wi-Fi module → Arduino Serial Pins
- Battery Pack → Motor Driver + Controller

Code Example:

```
// UGSV: Motor + Ultrasonic Obstacle Detection
#define trigPin 9
#define echoPin 10
#define motor1 5
#define motor2 6

long duration;
int distance;

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(motor1, OUTPUT);
  pinMode(motor2, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  // Measure distance
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  duration = pulseIn(echoPin, HIGH);
  distance = duration * 0.034 / 2;

  if (distance > 20) { // Safe distance
    digitalWrite(motor1, HIGH);
    digitalWrite(motor2, LOW); // Move Forward
  } else {
    digitalWrite(motor1, LOW);
    digitalWrite(motor2, LOW); // Stop
  }
  delay(200);
}
```

Learning Outcomes

- Understand motor control using L298N driver
- Learn obstacle detection with ultrasonic sensors
- Combine motors and sensors in a single project
- Build a beginner-level robotic surveillance vehicle

Next Steps & Applications

After the basic model, learners can enhance UGSV with **camera live streaming, GPS tracking, and IoT dashboards**. Applications include **border surveillance, disaster response, and security patrol robots**.

Get Started with UGSV at iTechBuilders

iTechBuilders provides **UGSV robotics kits, tutorials, and guidance** for **students, schools, and hobbyists**. Whether you are a beginner or advancing in robotics, we offer **DIY kits, workshops, and project mentorship**. **Contact us** to kickstart your UGSV journey today!